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The elliptical motion is, of course, probably somewhat perturbed by the attraction of the principal star, which, though very distant, is much larger, its apparent magnitude being about 4½, while the components of the binary pair are 9 and 10·8.

Assuming the above elements, and the parallax of the star at 0″·223 (as found by Prof. Asaph Hall), I have computed the following figures, which may be of interest.

Taking the Sun's mean distance from the Earth as unity, I find

Distance of 40 Eridani from the Earth	924955
Mean distance between the components, B C	26·86
Sum of masses of B C / Sun's mass = 1	1·003

Some new Red and Orange-red Stars. By the Rev. T. E. Espin.

The observations of the stars were made with a 9-inch Calver Reflector equatorially mounted, and with a 17¼-inch Calver reflector, equatorially mounted also, with driving clock, and circles reading in R.A. to 5 seconds, and in Declination to 1′. Since September 24 the observations were made with the latter instrument. The power used was a sweeping power of 70. The first column gives the number continued from the list given in vol. iii. *Liverpool Astronomical Society's Journal*, p. 82; the second, the D. M. number; the third the approximate R.A. and Declination brought up to 1885; the fourth, Argelander's magnitude; the fifth and sixth, the observed mean magnitude and colour; the seventh, the number of nights on which each star was observed; the eighth, the night it was detected. An asterisk denotes that the star was previously observed by my friend, the late Rev. T. W. Webb. Certain orange stars have been included, either because they are finely coloured, or because of a neighbouring blue star—a combination of frequent occurrence, the reason of which is at present unexplained. Mr. Webb's observations, and my own, where there seemed any reason for giving them in detail, will be found in the notes.

Abbreviations: RR, very red; R, red; R^1, pale red; R^2, very pale red. Shades of orange-red and orange denoted in the same way, by ORR, &c., and O.

No.	D.M.	R.A. 1885.	Decl.	Magnitude. Arg.	Magnitude. Obs.	Colour.	No. of Nights Obs.	Date.
	°	h m	° ′					1885.
33	54·116	0 30·6	+54 35·6	7·8	8·5	R^2	1	Dec. 4
34	39·167	38·3	+40 3·0	7·1	7·0	OR^2	3	Oct. 1
35	57·258	I. 12·5	+57 42·3	8·8	8·5	R	3	Dec. 2

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No.	D.M.	R.A. 1885.		Decl.		Magnitude. Arg.	Magnitude. Obs.	Colour.	No. of Nights Obs.	Date.
	°	h	m	°	′					1885.
36	57·320		25·7	+57	48·2	6·5	6·0	OR^1	1	Dec. 2
37	60·327		37·8	+60	27·2	8·5	8·5	RR	1	Dec. 2
38	60·335		38·2	+60	24·8	9·4	9·5	R^1	1	Dec. 2
39	59·466	II.	11·3	+59	29·0	6·7	6·6	O^3	2	Dec. 2
40	58·445		12·0	+59	8·1	8·8	8·5	R	2	Dec. 2
41	52·637		43·6	+52	32·4	7·0	7·5	OR^3	1	Nov. 16
42*	24·570	III.	41·2	+24	37·9	7·0	var.?	OR^1	2	Nov. 5
43*	25·599		50·6	+25	9·4	6·8	7·0	O^2	1	Nov. 17
44	2·640		57·3	+ 2	44·4	7·8	6·5	OR^1	1	Dec. 7
45	12·547		57·9	+12	11·2	7·7	7·5	R^1	1	Dec. 9
46	34·863	IV.	14·0	+34	17·6	7·5	8·0	OR	1	Nov. 30
47	34·874		16·8	+34	58·7	7·2	8·0	OR^1	1	Nov. 30
48	6·865	V.	5·9	+ 6	42·7	7·9	7·8	R	1	Dec. 16
49	45·1084		9·3	+46	0·0	7·8	var.	OR^1	7	Oct. 9
50	35·1046		11·5	+35	40·0	8·9	8·5	RR	3	Nov. 20
51*	—		12·5	− 8	22·2	—	8·5	ORR	1	Dec. 7
52	29·897		19·8	+29	49·2	8·0	8·0	RR	3	Nov. 14
53	—		19·6	−10	27·2	—	6·0	OR^1	1	Dec. 7
54	32·1030		26·2	+32	39·8	7·0	6·5	OR^2	2	Nov. 17
55	50·1225		38·3	+50	2·4	7·1	7·0	OR^1	1	Nov. 30
56	44·1288		40·2	+44	47·9	9·2	8·6	RR	8	Nov. 5
57	32·1109		44·0	+32	5·7	6·6	6·0	OR	1	Nov. 16
58	53·962		46·3	+53	26·1	8·0	8·2	R	2	Nov. 17
59	54·971		50·3	+54	32·6	7·0	7·0	O^1	2	Nov. 17
60*	44·1331		51·6	+44	58·9	8·1	8·0	O^2	2	Oct. 24
61	28·966		52·8	+28	7·0	6·9	7·5	O^2	2	Nov. 14
62	33·1290	VI.	9·9	+33	14·9	9·1	8·5	RR	2	Dec. 13
63	Anon.		41·5	+ 0	48·4	—	9·6	RR	4	Dec. 14
64	—		51·0	− 3	2·4	—	8·0	R	1	Dec. 16
65	—	VII.	11·8	−23	6	—	7·0 var.?	O	1	Dec. 1
66	54·1337	IX.	48·5	+54	48·2	7·0	7·5	OR^1	1	Dec. 13
67	27·2509	XV.	29·7	+26	54·6	8·2	8·0	R^1	4	June 30
68*	24·2901		33·3	+24	53·8	7·4	7·0	OR^1	1	June 30
69	35·2828	XVI.	26·8	+35	28·7	7·0	6·0	OR^2	2	June 30
70	35·2911		59·4	+35	34·2	6·5	6·5	OR^2	2	June 30
71	14·3201	XVII.	6·7	+14	38·3	7·3	7·0	O^1	1	July 13
72	17·3213		12·8	+17	14·3	7·5	8·0	O	1	July 13
73	17·3225		15·6	+17	10·2	7·8	7·0	R^1	1	July 13

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No.	D.M.	R.A. 1885.		Decl.		Magnitude. Arg.	Magnitude. Obs.	Colour.	No. of Nights Obs.	Date.
	°	h	m	°	′					1885.
74	12·3256		30·5	+12	6·6	7·0	7·0	R^{2}	1	July 9
75	35·3006		30·6	+35	57·1	7·5	7·8	OR^{3}	2	June 30
76	36·2937		42·8	+36	7·5	6·5	6·7	OR^{2}	2	June 30
77	36·2942		43·9	+36	35·7	6·5	6·7	R^{2}	2	June 30
78	12·3305		45·3	+11	59·4	6·4	7·0	O^{1}	1	July 9
79	1·3524		46·2	+1	8·2	6·8	7·5	R^{2}	1	July 8
80	1·3528		46·7	+1	20·5	6·0	7·0	R^{1}	1	July 8
81	17·3520	XVIII.	12·7	+17	55·4	7·5	7·0	R^{2}	1	July 13
82	38·3219		30·2	+38	20·9	7·3	7·0	OR	1	Sept. 25
83*	37·3180		33·6	+37	40·8	7·0	6·5	R^{2}	3	June 30
84	44·2961		37·3	+44	51·7	8·6	8·5	R^{2}	1	July 25
85	44·2969		38·8	+44	51·6	9·1	9·0	R^{2}	1	July 25
86*	39·3505		39·4	+39	11·1	6·5	7·0	OR	1	July 23
87	36·3339		53·1	+36	18·9	7·0	7·0	OR^{1}	1	June 30
88	23·3543		58·8	+23	10·8	8·0	8·5	R^{2}	2	July 2
89	38·3445	XIX.	4·3	+38	58·4	6·9	7·7	O^{2}	3	July 8
90	38·3493		10·0	+38	46·5	7·7	7·7	OR^{3}	3	July 4
91	38·3518		13·2	+38	46·6	6·7	6·9	R^{2}	1	June 30
92	37·3403		13·5	+37	23·8	8·0	8·0	R^{2}	2	June 30
93	17·3940		16·5	+17	26·4	9·5	var.	RR	3	Sept. 27
94	49·2999		21·5	+50	0·4	7·5	7·0	R^{1}	2	July 5
95	9·4114		23·0	+9	23·6	8·1	8·0	OR^{1}	3	July 8
96	25·3884		30·4	+25	44·9	8·2	8·3	OR^{2}	6	July 5
97	23·3706		31·0	+23	35·7	8·0	8·0	R^{1}	1	July 4
98*	17·4043		35·0	+17	37·7	8·2	8·0	O^{2}	2	July 20
99	37·3577		38·7	+37	24·8	7·9	8·0	OR^{2}	4	June 30
100*	−0·3386		39·6	−1	1·7	9·3	8·0	O	1	Sept. 25
101	40·3866		40·1	+40	25·9	6·3	6·0	OR	1	July 23
102	10·4046		41·1	+10	10·8	8·3	8·0	OR^{3}	3	July 8
103	35·3784		41·2	+35	47·7	9·1	9·5	R^{2}	2	July 2
104*	9·4264		42·4	+9	45·2	8·1	8·0	O^{1}	2	Sept. 24
105	38·3780		46·4	+38	25·5	5·5	6·0	O	1	July 23
106	37·3636		46·6	+37	31·4	7·0	7·0	R^{2}	2	June 30
107	25·4006		47·5	+25	40·0	8·5	8·5	OR	2	Oct. 5
108	44·3295		53·5	+44	44·5	9·0	8·0	R^{2}	1	July 25
109*	17·4185		54·9	+17	17·5	7·5	7·5 var.?	R^{1}	1	July 9
110*	37·3744		59·5	+38	0·1	7·2	8·5	R^{2}	2	July 12
111	14·4209	XX.	5·2	+14	12·4	7·5	8·0	O^{2}	1	Sept. 27

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No.	D.M.	R.A. 1885.		Decl.		Magnitude.		Colour.	No. of Nights Obs.	Date.
						Arg.	Obs.			
	°	h	m	°	′					1885.
112	38·4003		14·8	+38	38·4	6 8	7·0	OR^3	2	July 12
113	39·4130		14·5	+39	52·1	8·0	8·0	OR^1	1	Oct. 1
114	39·4152		17·5	+40	4·7	8 8	9·0	R^1	8	July 8
115	53·2384		17·5	+53	13·3	6·5	7·0	R^1	1	July 5
116*	39·4172		20·6	+39	46·5	7·5	8·0	OR^1	2	July 2
117*	15·4172		23·8	+15	52·8	8·3	8·5	R	1	July 9
118	39·4208		24·6	+39	35·7	9·2	var.	RR	17	July 9
119	45·3271		42·9	+45	37·6	8·8	8 6	RR	4	July 25
120	45·3289		44·9	+45	25·6	8·6	8·5	OR	3	July 25
121	50·3209		46·0	+50	20·9	7·3	7·5	R^1	1	July 5
122	49·3386		47·2	+49	41·5	6·8	7·5	R^1	2	July 5
123	45·3349		54·0	+45	47·8	8·1	8 0	RR	2	Dec. 15
124	47·3321	XXI.	6·5	+47	11·2	7·8	7·5	OR^3	4	July 25
125	49·3499		14·8	+49	34·9	7·0	6·5	OR^1	1	Oct. 27
126	62·1921		14·8	+62	26·3	8·7	9·0	OR	3	Nov. 5
127	48·3348		16·3	+48	51·7	8·2	8·5	R^2	1	Oct. 27
128	61·2134		22·8	+62	4·5	8·8	8·7	RR	5	Oct. 27
129	48·3470		37·7	+48	40·2	8 8	9·0	R	1	Oct. 27
130	70·1193		38·6	+70	15·7	7·0	8·5	OR^1	1	Dec. 2
131	57·2396		42·6	+57	32·0	7·5	8·7	ORR	1	Dec. 2
132	62·1997		49·6	+62	39 5	9·2	8·5	R^1	1	Nov. 5
133	65·1691		54·2	+65	36·2	6·5	6·5	OR^3	1	Nov. 5
134	38·4701	XXII.	6·3	+39	8·5	7·2	7 5	R^2	1	July 23
135	56·2793		26·0	+56	24·3	8·0	7·7	OR	4	Oct. 24
136	57·2562		30·2	+57	34·6	7·5	7·5	OR^2	8	Oct. 24
137	57·2568		32·4	+57	49·9	7·3	var.	OR^1	8	Oct. 24
138	42·4548		52·2	+42	23·5	6·8	7·0	OR^1	1	Nov. 30
139	57·2674		57·6	+57	37·3	8·4	8·5	R^1	1	Dec. 2
140	58·2534		57·8	+58	57·4	8·0	8·0	R^1	1	Dec. 2
141	48·4051	XXIII.	21·5	+48	52·9	9·3	9·0	OR	2	Nov. 16

Notes.

35. Closely f. H̥ VII. 42, a little N. Mr. Webb, 1877, Dec. 14, observed a star 8·0 30′ S. a little f. I can find no red star in this place now. The reading of Mr. Webb's circle is given, leaving no doubt concerning the correctness of the assigned place.

39. Remarkable pair. Two equal stars, second decided green; 10·5 comes makes a triangle.

42. November 5, 8·0; November 17, 6·5. Webb's observation, 1876, January 1, orange ruby, 7·0. November 17, confirmed as to colour. 1878,

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November 28, orange, but did not particularly attend to magnitude; but I do not think it could have been as large as 7·0.

43. Webb's observation, 1878, November 28, very pale ruby.

44. Blue star, 6·7, closely N.

47. Blue star, 20 sec. p., 8·0 magnitude.

48. Fine wide pair, 7·8 R, 8·0, 0′.

49. Near Capella. October 9, 8·0; October 24, 6·0; November 5 and 14, 7·3; (46°·989 = 7·1, 46·985 = 7·7); November 28, 7·6; November 30 and December 14, 7·4.

51. Webb's observation, 1878, January 25, pale ruby, 8·5.

54. Blue star, 6·5, near.

58. Blue star, 9·0, near.

60. Webb's observation, 1874, March 26, 9·3, very pale ruby.

63. A remarkably red star f. + 0°·1600 by 6½ seconds.

64. Place only approximately found from B 147.

65. *h* 3945 Canis Majoris. 1884, February 10, 6·5, red; 7·0, remarkably blue; 1885, December 1, 7·0, orange; 8·0, blue, very fine. The large star is probably variable.

68. Webb's observation, 1877, September 5, 8·0, orange ruby.

83. Webb's observation, 1882, August 10, pale ruby, 9·0.

86. Webb's observation, 1872, May 31, pale orange-red.

93. Compared with 17°·3938 = 9·0. September 27, 9·5; October 27, 9·5. On December 7 I was much astonished at finding it fully 8·5.

96. A triangle. 25°·3883 is at the apex. The shades of colour in these two stars very perplexing. The latter once blue; at other times orange, and orange red. Its mean magnitude is 8·4.

98. Webb's observation, 1876, October 14. Very pale orange or ruby, 9·0; 1884, September 5, pale ruby, 9·0.

99. Fine field. Star p. 8·0, very blue.

100. Webb's observation, 1882, September 15, orange, with 10, pale blue, a few minutes p.

104. Webb's observation, 1879, September 3. 8·5. 9·5. 300° ± 50″, pale orange-red. pale yellow. On September 24, 25, I found the colours orange and blue, the blue being especially remarkable.

109. In a glorious field, the lucida 6½ orange. Webb's observation, 1880, August 9, beautiful wide group, with 6·0 pale orange. 1881, October 14, fine group attendant on 7·0, pale orange, with 9·0, pale orange, or orange red, S.

110. *h* 1470 comes 10·2, very blue. Webb's observation, 1879, September 25, 8·5, 9·5, pale orange-red; pale blue.

111. Comes 12·0, 20″ ±.

116. Webb's observation, 1876, August 30, 8½, orange ruby.

117. 8·0, blue, near. Webb's observation, 1873, September 12, ruby, 9·0. Comes 14 NP. 1875, October 2, pale ruby, 8·5. Two faint comites Np.

118. Compared with 39°·4210, 8·0, and 39°·4206, 8·8, clear blue. On the night of its discovery it was fully 7·9 out of focus, since which time it has irregularly diminished to 9·0. The colour is very fine. The Rev. T. W. Webb swept over this region repeatedly, but has no note of it.

124. A blue star near 7·3 magnitude.

133. A pale blue, 6·5, near.

137. Variable in some short period between 7·0 and 8·0. No. 136 used as a comparison star = 7·5. The following are all my observations of it:—

1885, Oct. 24	8·0	1885, Dec. 5	7·6
27	7·0	7	7·6
Nov. 16	7·2	11	7·2
Dec. 2	7·2	15	7·1

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The New Star in Orion photometrically and spectroscopically observed at the Oxford University Observatory. By Prof. C. Pritchard, D.D., F.R.S.

Date of Observation. 1885.	Mag. of Nova when compared with		Adopted Mean Mag. of Nova.	Notes.
	Polaris =2·05.	57 *Orionis* =6·03.		
Dec. 23	6·49	6·43	6·46	
28	6·42	6·42	6·42	Fine night.
29	6·45	6·32	6·39	Very fine night.
1886. Jan. 2	6·47	6·39	6·43	Fine night; slight fog.
5	6·71	6·76	6·74	Fine night.
8	6·80	6·63	6·72	Fine night; but bad definition.
11	6·69	6·74	6·72	Fine night; haze low down.
18	6·92	6·83	6·87	Sky very fine.
26	6·77	6·90	6·82	Fine night.
Feb. 7	7·02	6·86	6·94	Bad definition; fine night.
23	6·93	7·13	7·03	Very fine night.
March 9	7·22	7·05	7·14	Fine nights; with low definition.
10	7·05	7·13	7·09	

Colour and Spectrum.—On December 23 the colour of the star was noted to be red-orange; spectrum columnar and four bands noticeable with Vogel eyepiece spectroscope. On December 29, in better definition, two other bands were seen in the red. On January 8 bright lines were specially looked for, but it was impossible to say whether any definite bright lines existed. The red colour has diminished considerably during the time the star has been watched, and is now not at all conspicuous.

I think that as far as the foregoing magnitude of the *Nova* are concerned, the accuracy is considerable; the main result being that from the time of its first observation here to the present, the star has decreased in brightness by about half a magnitude, viz. about 6·5 to 7·0 mag.

With regard to perhaps the more important question of the character of the spectrum, what is said above—viz. that it is seen here with six bands—must be read with the limitations due to the character of the small spectroscope employed; the larger and more delicate instrument belonging to the Observatory being at present at Greenwich. Still even with the largest forms of spectroscopes at the Royal Observatory and at Dun Echt the apparently contradictory results are perplexing.

Oxford University Observatory:
March 11, 1886.